

What is claimed is:

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1. An information recording medium on which information is recorded with light and an external magnetic field applied to the recording medium, the information recording medium comprising:
a substrate and
a magnetic layer formed on the substrate;
the magnetic layer including a data region and a positioning region, the positioning region having management information for managing the data region and a servo pattern, the management information and the servo pattern being formed as magnetic marks.
2. The information recording medium defined in Claim 1, wherein the magnetic layer is a perpendicular magnetic recording film.
3. The information recording medium defined in Claim 1, wherein the magnetic marks are recorded on a light pulse and magnetic field modulation system.
4. The information recording medium defined in Claim 1, wherein the magnetic marks are rectangular.
5. The information recording medium defined in Claim 1, wherein the servo pattern includes a pattern for servo-

controlling a reproducing magnetic head, and the pattern is equal in width to or narrower in width than the reproducing magnetic head in a widthwise direction of the tracks.

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6. A recording and reproducing apparatus for recording information on and reproducing information from an information recording medium including a substrate and a magnetic layer provided on the substrate, the magnetic layer having a servo pattern and management information recorded thereon as magnetic marks, the recording and reproducing apparatus comprising:

an optical head for irradiating the information recording medium with light during information recordation;

a recording magnetic head for applying a recording magnetic field to the information recording medium;

a reproducing magnetic head for detecting magnetic leakage fields from the magnetic marks on the magnetic layer during information reproduction;

a first positioner for positioning the optical head and the recording magnetic head at a target track of the information recording medium on the basis of magneto-optical signals from the magnetic marks; and

a second positioner for positioning the reproducing magnetic head at the target track during information reproduction, with the reproducing magnetic head detecting the magnetic leakage fields from the magnetic marks.

7. The recording and reproducing apparatus defined in Claim 6, wherein the first positioner includes:

a detector for detecting light from the magnetic marks;
a first control signal generator for obtaining positional information about the optical head and the recording magnetic head from detected signals from the magnetic marks detected by the detector, and generating a control signal for positioning the optical and recording magnetic heads at the target track; and
a first actuator for moving the optical head and the recording magnetic head to the target track on the basis of the control signal.

8. The recording and reproducing apparatus defined in Claim 6, wherein the second positioner includes:

a second control signal generator for obtaining positional information about the reproducing magnetic head from signals from the magnetic marks detected by the reproducing magnetic head, and generating a control signal for positioning the reproducing magnetic head at the target track; and

a second actuator for moving the reproducing magnetic head to the target track on the basis of the control signal from the second control signal generator.

9. The recording and reproducing apparatus defined in Claim

6, and further comprising a slider for floating over the information recording medium, the slider including the optical head and the recording and reproducing magnetic heads.

10. The recording and reproducing apparatus defined in Claim 6, wherein the reproducing magnetic head is an MR head or a GMR head.

11. The recording and reproducing apparatus defined in Claim 6, wherein the optical head includes a solid immersion lens.

12. The recording and reproducing apparatus defined in Claim 6, wherein the optical head and the recording and reproducing magnetic heads are positioned on the same side of the information recording medium.

13. The recording and reproducing apparatus defined in Claim 6, wherein the optical head is positioned on one side of the information recording medium while the recording and reproducing magnetic heads are positioned on the other side.

14. The recording and reproducing apparatus defined in Claim 6, wherein the recording and reproducing magnetic heads include a magnetic field generator and a magnetic field detector, respectively, the radiation of light from the optical head forming

a light spot on the information recording medium, the light spot being larger than the magnetic field generator and the magnetic field detector.

15. The recording and reproducing apparatus defined in Claim 6, wherein the magnetic marks are rectangular.

16. A method for positioning an optical head, a recording magnetic head and a reproducing magnetic head at a predetermined track of an information recording medium including a substrate and a magnetic layer provided on the substrate, the magnetic layer having magnetic marks recorded thereon which represent a servo pattern and management information, the method comprising the steps of:

irradiating the information recording medium with a laser beam to detect magneto-optical signals from the magnetic marks, and [controlling the positions of the optical head and the recording magnetic head on the basis of the detected magneto-optical signals,] during information recordation; and

detecting magnetic leakage fields from the magnetic marks with the reproducing magnetic head, and controlling the position of the reproducing magnetic head on the basis of the detected magnetic leakage fields, during information reproduction.

17. The method defined in Claim 16, wherein the optical head

and the recording and reproducing magnetic heads are positioned on the same side of the information recording medium.

18. The method defined in Claim 16, wherein the optical head is positioned on one side of the information recording medium while the recording and reproducing magnetic heads are positioned on the other side.

19. The method defined in Claim 16, wherein the optical head irradiates the information recording medium with light and form a light spot on the medium, the recording and reproducing magnetic heads including a magnetic field generator and a magnetic field detector, respectively, the light spot being larger than the magnetic field generator and the magnetic field detector.

20. The method defined in Claim 16, wherein the magnetic marks are rectangular.